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<p>(21) International Application Number: PCT/GB95/01217</p> <p>(22) International Filing Date: 26 May 1995 (26.05.95)</p> <p>(71) Applicant (for all designated States except US): RANPAK CORP. [US/US]; 8023 Crike Road, Concord Township, OH 44077-9702 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): KUNG, Kurt [CH/CH]; Sunnberg Strasse 2, CH-8447 Daghse (CH). MARCHIONI, Livio [CH/CH]; Muhleberger 32C, CH-8910 Affoltern am Albis (CH).</p> <p>(74) Agents: POWELL, Timothy, John et al.; D. Young & Co., 21 New Fetter Lane, London EC4A 1DA (GB).</p>		<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>	
<p>(54) Title: A COMBINED PACKING TABLE AND CUSHIONING CONVERSION MACHINE; AND A RELATED METHOD OF PRODUCING FILLED PACKAGES</p> <p>(57) Abstract</p> <p>It is known to provide packing tables including dispensers for packing materials. However, hitherto such tables have been fixed-height items. Thus, there are disadvantages when it is required to make large packages on the packing tables. The disclosure relates to a packing table (10) having a fixed-height work surface (14) and an adjustable-height work surface (44). The adjustable-height work surface (44) is adjustable by means of a linear actuator (46) that is controlled by suitable control switches (45). Preferred embodiments of the invention include a cushioning dunnage convertor (100) integral with the packing table (10) so that the dunnage outlet (86a) of the convertor (100) emerges between the fixed height and adjustable height surfaces of the packing table.</p> <img alt="Technical drawing of a combined packing table and cushioning conversion machine. The drawing shows a top work surface 10 with a fixed height 14 and an adjustable height 44. The adjustable height 44 is controlled by a linear actuator 46 and a switch 45. A cushioning dunnage convertor 100 is integral with the table, featuring a dunnage outlet 86a. The machine is supported by legs 11 and 12, with a base 30 and a side panel 31. Various other components are labeled with numbers 20, 21, 22, 23, 24, 26, 27, 30, 40, 41, 42, 43, 45, 46, 48, 60, 61, 62, 86a, 12, 13, 14, 14c, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 580, 581, 582, 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813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 129			

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-1-

**A COMBINED PACKING TABLE AND CUSHIONING
CONVERSION MACHINE; AND A RELATED
METHOD OF PRODUCING FILLED PACKAGES**

5 This invention relates to a packing table and a cushioning dunnage conversion machine in combination; and to a related method of producing filled packages employing such a table.

10 Such combined packing tables and cushioning conversion machines may be typically used in factories, mail rooms, warehouses, distribution centres, stores and indeed anywhere that it is desired to produce filled packages on anything more than an occasional basis. One packing table and cushioning dunnage convertor combination of particular utility is described in U.S. Patent Application Serial No. 08/109,124 assigned to Ranpak Corporation of Cleveland, Ohio, U.S.A. This packing table includes a cushioning dunnage convertor that converts stock material, e.g. paper stock, into cushioning dunnage.

15 Previous packing tables have been of varying degrees of utility depending on their levels of sophistication, but tend to suffer from the disadvantage that they are dedicated to the production of packages in a limited range of sizes. This is because packaging operations carried out by manual workers tend to be repetitive and consequently it has hitherto been thought desirable to build or permanently adjust packing tables so that they are positioned comfortably for the majority of operations carried out by their users.

20 However, if it is required to produce packages of differing sizes, shapes or

-2-

configurations there is a strong possibility that for some or even a majority of operations carried out using prior art packing tables the packing table operators suffer discomfort. This can have adverse effects on individuals' work quality, concentration and productivity.

5 The foregoing disadvantage can arise even if there is a requirement to produce only two variant packages at a particular packing table.

Furthermore, some packing tables are used by shift workers and hitherto it has not been possible to provide for the comfort of workers of greatly differing size who use the same packing table during successive shifts.

10 According to the invention in a first aspect, there is provided in combination, a packing table and a cushioning conversion machine;

the packing table including a first work surface and a second work surface adjacent the first work surface;

15 the heights of the first and second work surfaces being selectively vertically adjustable one relative to the other;

the cushioning conversion machine including a frame, and conversion assemblies mounted to the frame which convert a sheet-like stock material into a strip of dunnage; and

20 the frame having an outlet through which the strip of dunnage emerges, the outlet being positioned to supply the dunnage to at least one of the first work surface or the second work surface.

This arrangement overcomes at least some of the disadvantages stated above as pertaining to the prior art.

25 It is preferable that the outlet is disposed between the first and second work surfaces. Conveniently the cushioning conversion machine is positioned beneath the packing table, in particular beneath the first work surface. This enables the advantages e.g. of the dunnage convertors of U.S. Patent Applications Serial Nos. 08/109,124 and 08/155,931 to inure to apparatus according to the invention. (For the avoidance of doubt, it is stated that the dunnage convertor may optionally be moveable relative to the packing table, e.g. in the manner described in U.S. Patent Application Serial No. 08/155,931.)

Conveniently, the packing table includes a sub-chassis supporting the second work surface and an actuator operatively connected between the further work surface and the sub-chassis; and in particularly preferred embodiments the actuator is a linear actuator whereby to cause linear adjustment of the height of the further work surface.

5 It is further preferable that the actuator is a powered actuator; however, in an alternative embodiment the actuator may be manually operable.

The foregoing features advantageously ensure that the apparatus of the invention is convenient and easy to use.

10 In particularly preferred embodiments the first and further work surfaces form a substantially contiguous work surface when the first and further work surfaces are at the same relative height.

The foregoing features confer particular utility on preferred embodiments of the invention.

15 Conveniently the cushioning conversion machine includes a forming assembly which forms the sheet-like stock material into a strip of dunnage; and a feeding assembly which advances the sheet-like stock material through the forming assembly. The conversion machine may also optionally include a stock supply assembly which supplies the sheet-like stock material, such as paper in single or multi-ply form to the forming assembly and a cutting assembly for cutting the dunnage into sections of a 20 desired length.

These arrangements advantageously ensures that the advantages, such as those described in WO 92/05948, associated with cushioning dunnage conversion machines inure to the apparatus of the invention.

25 Other preferable features of embodiments of the table/machine combination are that:

- (i) the forming assembly inwardly folds the sheet-like stock material to form the strip of dunnage;
- (ii) the feed assembly is a pulling assembly which pulls the sheet-like stock material through the forming assembly;
- 30 (iii) the pulling assembly is a pulling/connecting assembly which connects the strip of dunnage;
- (iv) the pulling/connecting assembly coins the strip of dunnage;

- (v) the sheet-like stock material is recyclable and/or biodegradable;
- (vi) the sheet-like stock material is multiple plies of paper;
- (vii) the multiple plies of paper are provided via a single stock roll; and/or
- (viii) the first work surface remains at a fixed height.

5 According to a second aspect of the invention, there is provided a method of producing filled packages comprising the steps of, in any suitable order: placing a receptacle having an opening for an article to be packed on the second work surface of a machine/packing table combination in accordance with the invention as hereinabove defined;

10 adjusting as necessary the height of the work surface until the opening is at a suitable height for filling of the receptacle;
operating the cushioning conversion machine to produce a strip of dunnage;
placing an article and any desired packaging material in the receptacle; and, optionally,

15 closing the opening in the receptacle.

There now follows a description of a preferred embodiment of the invention, by way of example, with reference being made to the accompanying drawings in which:

20 Figure 1 is a perspective, schematic view of a packing table in accordance with the invention;

Figure 2 is a plan view from above of the work surfaces of the table of Figure 1; and

Figure 3 is a plan view of a typical dunnage convertor that may be incorporated into the packing table of Figures 1 and 2.

25 Referring to the drawings, there is shown a packing table 10 incorporating a cushioning dunnage convertor 100 of the kind shown in plan in Figure 3. Packing table 10 includes a framework formed e.g. from extruded aluminium members that define a chassis. Parts of the chassis are visible as legs 11 protruding downwardly from the underside of the packing table in order to provide support therefor. In the embodiment shown, each leg 11 terminates in a screw-adjustable foot 12 that may be adjusted to level the table. Other ground-engaging means such as casters may alternatively be used.

-5-

The legs 11 and the remainder of the framework defining the chassis support a packing table housing 13 the upper surface 14 of which is finished in a hardwearing material that may be chosen to have non-slip characteristics, in order to form a surface on which packaging operations may take place.

5 At the left hand end of the embodiment shown in Figure 1, there is mounted a stock supply assembly indicated generally by reference numeral 20, the function of which is to supply stock material e.g. in the form of single or multi-ply paper to a cushioning dunnage convertor (not visible in Figure 1) secured within housing 13.

10 Stock supply assembly 20 includes a pair 21, 22 of generally "C"-shaped members secured to the housing 13 and legs 11 at the front and rear of the apparatus such that the limbs of the C-shaped members protrude to the left hand side of the apparatus as viewed in Figure 1.

15 The arrangement is such that the corresponding limbs of the respective C-shaped members 21, 22 are parallel with one another. The upper limbs lie in a first, common plane and the lower limbs lie in a second, common plane.

The lower limbs each include a notch such as notch 23 for receiving the shaft of a roll 24 of stock material which in the embodiment shown is single-ply kraft paper.

20 The upper limbs of the C-shaped members each include an upwardly extending ear 26. A pair of vertically spaced rods 27, 28 extend generally horizontally between the resulting pair of ears 26, such that there is a gap between the rods 27, 28.

25 In use of the apparatus, stock material is unwound from the roll 24 and fed from the left hand side of the apparatus as shown in Figure 1 through the gap between the rods 27, 28. From there, the paper is fed via an inlet opening in the left hand end of housing 13 into the dunnage convertor contained therein. This results in continuous feeding of the stock material until the roll 24 is used up, at which point a fresh roll 24 may be loaded onto the lower limbs of the C-shaped members and fed as aforesaid.

30 As is described below, the dunnage convertor includes a post-cutting constraining assembly 86, which is in the form of a rectangular-section tube. In the immediate vicinity of the cushioning dunnage convertor 100, the post-cutting constraining assembly extends horizontally, and it protrudes through an aperture in

-6-

the right hand end of housing 13. At this point, the post-cutting constraining assembly 86 is cranked upwardly to terminate in an outlet 86a the opening of which is at the same level as the surface 14 of packing table 10.

5 The dunnage convertor includes various components for producing low-density cushioning material (dunnage) from the stock material; and a cutter for cutting discrete lengths of the formed dunnage.

10 It will thus be appreciated that in use of the packing table, once the cushioning dunnage convertor has been fed with paper from roll 24, it is possible for an operator to produce lengths of low-density, pad-like cushioning dunnage from the outlet 86a for use in packages that the operator is in the process of forming at the packing table 10. Suitable electrical controls 30 are mounted on a power supply housing 31 in order to provide control over the operation of the dunnage convertor 100.

15 In practical embodiments of the invention, the controls would additionally include e.g. a foot pedal connected to the control circuitry of the dunnage convertor, so that the operator can produce cushioning dunnage at will without the need for intervention by hand.

20 At the right hand end of packing table 10 there is provided a further work surface 44 the height of which is adjustable in the directions indicated by arrows A and B. A further control panel 45 includes suitable electrical controls for causing raising and lowering of further work surface 44, by means of an electric actuator 46 secured in a sub-chassis secured to the chassis previously referred to.

25 The sub-chassis comprises upper and lower pairs of horizontally spaced, extruded members 40, 41; 42, 43. The upper pair of members 40, 41 are interconnected by a horizontal brace 48 at the ends of the members 40, 41 remote from housing 13; and the lower members 42, 43 are interconnected by a further bracing member 49.

30 The undersides of the free ends of the members 42, 43 include screw-adjustable feet, such as feet 12 previously referred to, for assisting in levelling of the apparatus 10. Thus it will be seen that there is provided a rigid framework secured to and extending from the right hand side of the apparatus 10 as shown in Figure 1.

The spacings of the members 40, 41 and 42, 43 are such that a square-section, linear electric actuator 46 may be fixedly secured therein. The upper end of actuator

-7-

46 includes an actuator rod 46a that is secured to the underside of work surface 44 and on operation of the appropriate controls secured on control box 45 the work surface 44 may be raised or lowered as desired.

As is best shown in Figure 2, further work surface 44 includes a recess 50 that is shaped to permit the work surface 44 to rise and fall without fouling on the post-cutting constraining assembly outlet 86a. As is shown by the dotted outline represented by reference numeral 46b in Figure 2, the upper end of actuator rod 46a terminates in a large area element, so that in the embodiment shown the entire weight of the further surface 44 is supported and guided by actuator 46 and there is no need for additional guide members. However, such members could if desired be incorporated, for example extending vertically at the corners of housing 13 at the positions 52 and 53 shown in Figure 2.

It will be apparent from Figure 2 that if desired the further work surface 44 can by means of actuator 46 be raised such that its surface lies in a common plane with work surface 14. When thus configured, the packing table of the invention may simply be considered as a large area packing table having an outlet 86a for low density dunnage material approximately two thirds of the way along its length. The locating of the outlet 86a in this position permits the production of dunnage material for use at either end of the packing table.

The apparatus of the invention may be used in a number of ways in addition to the manner described above. For example, an operator who has to produce a large number of packs of a generally small size and occasional packs of a large size could operate the controls at control panel 45 to lower the further work surface 44 to a suitable height for the large packs, and then simply leave the further work surface 44 in that position ready for the occasions when it is necessary to produce large packs. The operator would then spend the majority of his or her time working at the work surface 14, and would only turn to further work surface 44 when it proves necessary to produce large packs.

Alternatively, an operator could work by repeatedly altering the height of further work surface 44 relative to work surface 14, as would be required if the numbers of large and small packs to be created were approximately equal.

Yet a further possibility lies in operating the actuator 46 to adjust the height

of further work surface 44 e.g. at the start and end of a shift, in order to accommodate operators on successive shifts of different sizes.

5

There are numerous other ways in which the apparatus of the invention can be operated, and these will become apparent to those skilled in the art on reading this description. It will however be appreciated that the apparatus of the invention is exceedingly versatile in its ability to provide an efficient, comfortable work station under various differing circumstances.

10

The embodiment shown in Figure 1 includes an optional superstructure 60 at the rear of housing 13. Superstructure 60 extends upwardly of work surface 14 and terminates in a shelf 61. Shelf 61 may optionally be sub-divided by means e.g. of dividers such as hoops 62 shown in Figure 1. A greater number of hoops 62 than those shown can be provided if desired.

15

Figure 3 generally illustrates the internal conversion assemblies of a preferred cushioning conversion machine such as that shown in U.S. Patent No. 5,123,889 to which reference may be had for further details. The convertor 100 includes a forming assembly 120, a feed gear assembly 122, a cutting assembly 124, and the post-cutting constraining assembly 86. The general operation of these assemblies is described in detail in U.S. Patent No. 5,123,889.

20

Access to the convertor 100 is achieved in the embodiment shown by virtue of work surface 14 being hinged at break line 14c, whereby work surface 14 is divided into two portions 14a, 14b. It will be evident that work surface 14b can be pivoted about break line 14c to provide access to cushioning dunnage convertor 100.

25

It will be appreciated that the packing table of the invention may be embodied in numerous ways, and need not be restricted to the precise form shown in the drawings. Furthermore, various materials and finishes may be used for or applied to the components of the table.

CLAIMS

1. In combination, a packing table and a cushioning conversion machine; the packing table including a first work surface and a second work surface adjacent the first work surface;

5 the heights of the first and second work surfaces being selectively vertically adjustable one relative to the other;

the cushioning conversion machine including a frame, and conversion assemblies mounted to the frame which convert a sheet-like stock material into a strip of dunnage; and

10 the frame having an outlet through which the strip of dunnage emerges, the outlet being positioned to supply the dunnage to at least one of the first work surface or the second work surface.

15 2. A table/machine combination according to claim 1 wherein the outlet is disposed between the first and second work surfaces.

3. A table/machine combination according to claim 1 or claim 2 wherein the cushioning conversion machine is positioned beneath the packing table.

20 4. A table/machine combination according to claim 3 wherein the cushioning conversion machine is positioned beneath the first work surface.

25 5. A table/machine combination according to any preceding claim wherein the packing table includes a sub-chassis supporting the second work surface and an actuator operatively connected between the second work surface and the chassis.

6. A table/machine combination according to claim 5 wherein the actuator is a powered actuator.

30 7. A table/machine combination according to claim 5 wherein the actuator is manually operable.

-10-

8. A table/machine combination according to any preceding claim wherein the first and second work surfaces form a substantially contiguous work surface when the work surfaces are at the same relative height.

5 9. A table/machine combination according to any preceding claim wherein the conversion assembly includes:

a forming assembly which forms the sheet-like stock material into a strip of dunnage; and

10 a feed assembly which advances the sheet-like stock material through the forming assembly.

10. A table/machine combination according to claim 9 wherein the cushioning conversion machine further comprises:

15 a stock supply assembly which supplies the sheet-like stock material to the forming assembly; and

a cutting assembly which cuts the strip of dunnage into sections of a desired length.

20 11. A table/machine combination according to claim 10 wherein the forming assembly inwardly folds the sheet-like stock material to form the strip of dunnage.

25 12. A table/machine combination according to claim 11 wherein the feed assembly is a pulling assembly which pulls the sheet-like stock material through the forming assembly.

13. A table/machine combination according to claim 12 wherein the pulling assembly is a pulling/connecting assembly which connects the strip of dunnage.

30 14. A table/machine combination according to claim 13 wherein the pulling/connecting assembly coins the strip of dunnage.

-11-

15. A table/machine combination according to any preceding claim wherein the sheet-like stock material is recyclable and biodegradable.

5 16. A table/machine combination according to claim 15 wherein the sheet-like stock material is multiple plies of paper.

17. A table/machine combination according to claim 16 wherein the multiple plies of paper are provided in a single stock roll.

10 18. A table/machine combination according to any preceding claim wherein the first work surface remains at a fixed height.

19. A method of producing filled packages comprising the steps of, in any suitable order:

15 placing a receptacle having an opening for an article to be packed on the second work surface of a machine/packing table combination according to any preceding claim;

adjusting as necessary the height of the second work surface until the opening is at a suitable height for filling the receptacle;

20 operating the cushioning conversion machine to produce a strip of dunnage; placing an article and the strip of dunnage in the receptacle; and, optionally,

closing the opening in the receptacle.

25

1 / 2

FIG. 1

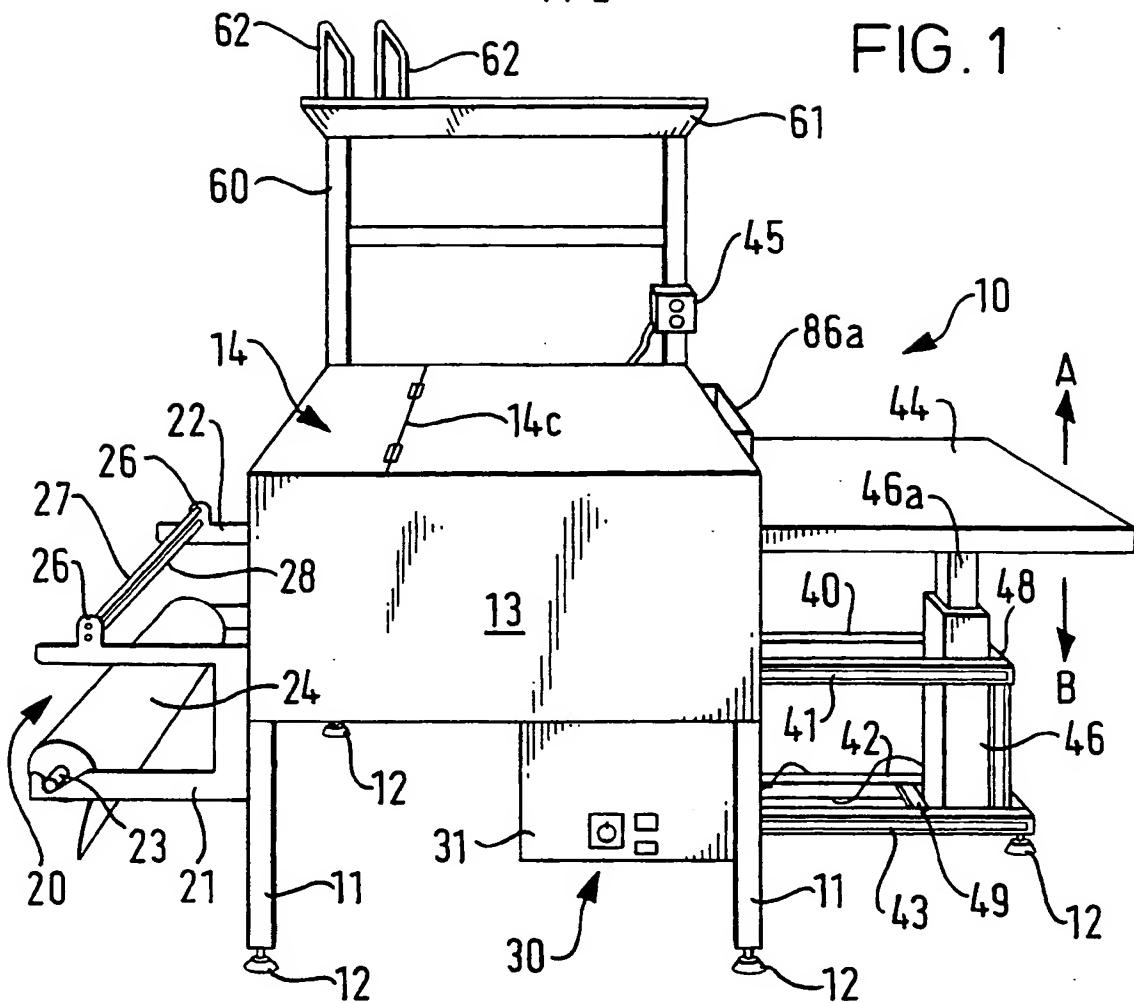


FIG. 2

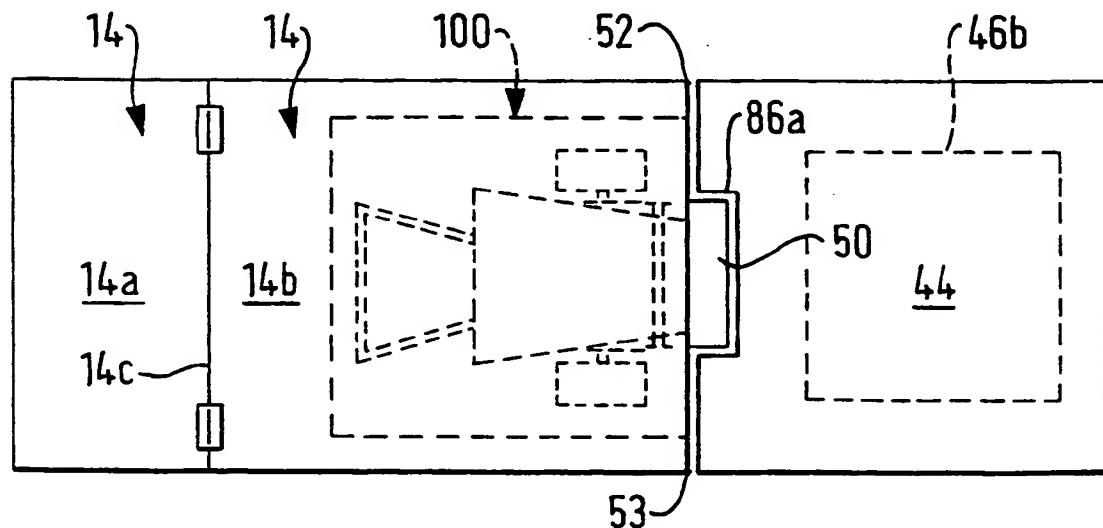
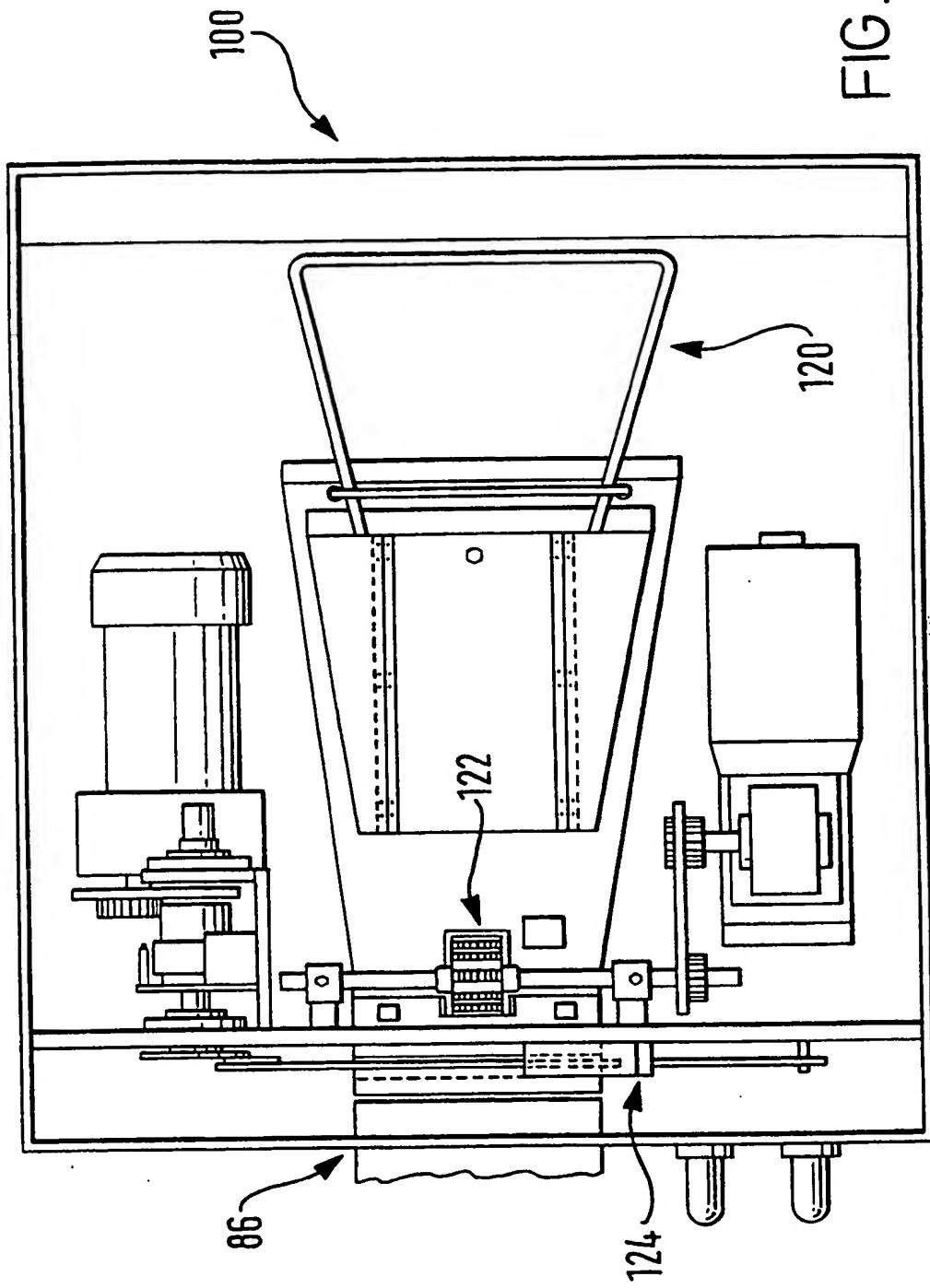


FIG. 3



INTERNATIONAL SEARCH REPORT

Intern : Application No
PCT/GB 95/01217

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B31D5/00 B65B67/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B31D B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,92 05948 (RANPAK CORP) 16 April 1992 cited in the application ---	1,19
A	US,A,5 163 270 (TREIBER FRITZ F) 17 November 1992 ---	1,19
A	US,A,3 722 177 (MICHELS C) 27 March 1973 -----	1,19

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 February 1996	19.02.96
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Roberts, P

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. Application No

PCT/GB 95/01217

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A-9205948	16-04-92	US-A- 5322477 US-A- 5123889 AU-B- 3017495 AU-B- 664357 AU-B- 8662291 CA-A- 2093124 DE-U- 9116966 DE-U- 9116971 EP-A- 0554338 EP-A- 0677379 EP-A- 0688664 JP-T- 6504238 PT-A- 99162 TR-A- 26145 US-A- 5468208	21-06-94 23-06-92 02-11-95 16-11-95 28-04-92 06-04-92 10-11-94 03-11-94 11-08-93 18-10-95 27-12-95 19-05-94 31-12-93 15-02-95 21-11-95
US-A-5163270	17-11-92	NONE	
US-A-3722177	27-03-73	NONE	

